Navy Installation Management Accounting Project (IMAP) Proposed Model & Transactional System Approach

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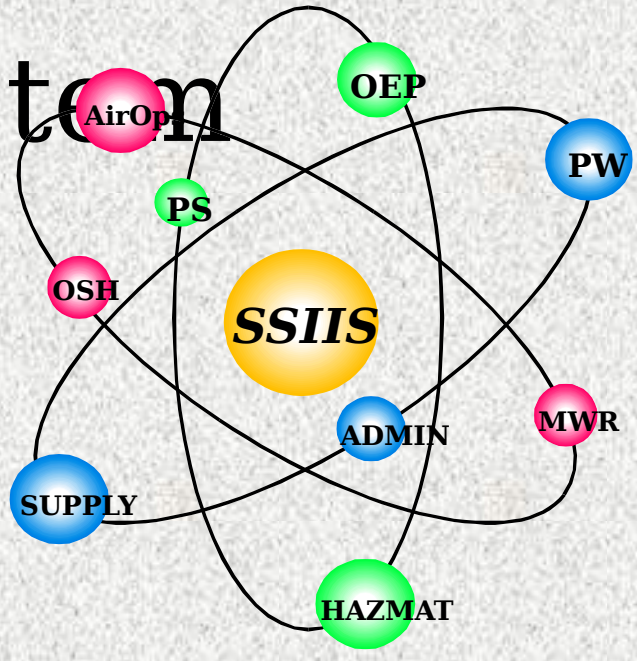


Areas to be Discussed

Installation Management Accounting Project (IMAP)

- Business Process Mapping

Comparing Tri-Service Standards to IMAP

- Scope
- Content

Data Standardization

- Normalized Data Model
- TSSDS/TSFMS Model

Enterprise Wide Information Systems

- Case Study: NAS Patuxent River

Conclusion

- What Portion of TSFMS Should Be Transactional?

Navy Installation Management Accounting Project (IMAP)

- Endorsed by FTAG and EWG as a temporary proposal for a “Facilities Management” Business Model until we decide on a better one

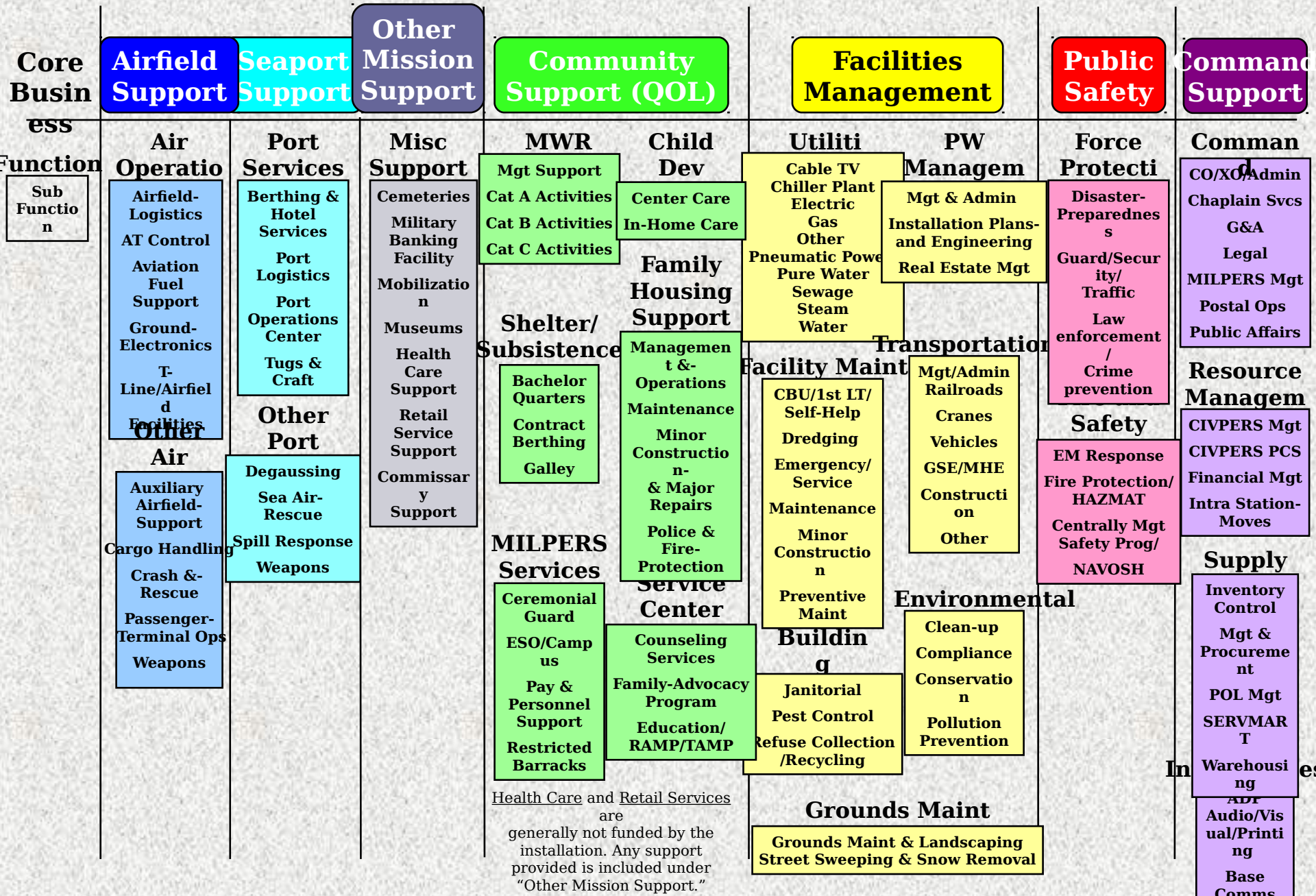
Purpose of the IMAP Model

- Navy-wide Approach to Installation Management
  - A published Structured Business Model
- Improve Managerial Decision Making
  - Data driven Information
- Accurate Consistent Cost Tracking
  - Apples to Apples Comparison
- Meaningful Comparison to Past Performance
  - Metrics based on Readiness
- More Efficient Use of Resources
  - Use of limited dollars wisely

Navy Business Perspective
(Installation Management)

- IMAP model includes:
  - **Seven (7) Core Businesses**
    - **Core Business:Facilities Management, Public Safety…**
  - **Core Businesses are further subdivided into 24 Functions**
    - **Functions: Utilities, Facility Maintenance**
  - **Funtions are further subdivided into 105 Sub Functions**
    - **Subfunctions: Service Mtn, Minor Const.**

Navy Installation Management Accounting Project



Navy's View of Facilities Management

Utilities

Cable TV
Chiller Plant
Electric
Gas
Other
Pneumatic
Power
Pure Water
Sewage
Steam
Water

Environmental

Clean-up

Compliance

Conservation

Pollution Prevention

PW Managem

Mgt & Admin

Installation Plans- and Engineering

Real Estate Mgt

Transportation

Mgt/Admin
Railroads

Cranes

Vehicles

GSE/MHE

Construction

Other

Facility Maint

CBU/1st LT/ Self-Help

Dredging

Emergency/ Service

Maintenance

Minor

ding

Janitorial

Pest Control

Refuse Collection /Recycling

Grounds Maint

Grounds Maint & Landscaping
Street Sweeping & Snow Removal

Navy Installation Management

- It is estimated that 70% of an Installation's business is associated with or requires "Inventory Type" data.

- Therefore, the Scope of the TSFMS as a Facilities Management Standard may need to be bigger than we originally thought.

Benefits of an IMAP type approach to a Transactional Data Model

- Allows for Business Process Reengineering
  - Align business functions using a business hierarchy
- Data Model
  - Avoid stovepipe systems by coding applications against a single data model and
  - Improve business reporting credibility by querying against a single source.

The TSSDS/TSFMS Approach

Structure

- Is it compatible with the IMAP concept of Installation Management and Accounting?
  - I.e. Database modeled to 3rd normal form?

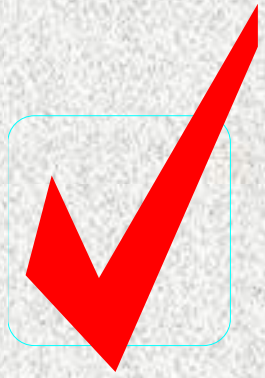
Content

- What else do we need to address to provide services to all Federal Property Managers?

TSSDS/TSFMS Data Model

FACTS: *(From a User's Perspective)*

- Compatible with installation mapping requirements and other Federal standards
- Thematic organization of database schema (not 3rd normal form)
  - To satisfy Entity Set Construct
- GIS Application driven
  - COTS requirements influence the structure
- Relational database structure
- User driven
  - To enhance content not the relationship perspective
  - Potentially causing feature and/or attribute inconsistencies



TSSDS/TSFMS Data Model

BENEFITS:

- Ensure interoperability across computer platforms
- Ensure interoperability across DOD activities and services
- TSSDS and TSFMS share common tables
- TSSDS and TSFMS support installation planning and mapping requirements
- TSSDS/TSFMS are supported by the Tri-Service Organizations

How do the two approaches line up?

- So far, it looks as though the TSSDS/TSFMS approach will not support the IMAP Transactional model piece.

- Based on the current direction of the Tri-Service Standards, GIS can be part of an Enterprise Solution, it just won’t be part of a fully relational transactional database.

How can we Satisfy Everyone's Needs?

- Identify which attributes are truly transactional
  - begin to normalize the data structure.
- Understand the "business" in order to normalize the model
  - not an easy task across 4 major organizations.
- Maintain connectivity between the "new" transactional piece and the 25 entity sets.
  - Propose the Center manage these joins

Transactional Data Perspective

(3rd normal form fully relational dbms)

- Thematic organization is arbitrary
- Which application is used to access data in the model is irrelevant
- Data names, structures, and definitions must be the same between systems/standards
- The Logical model should always be true to business rules

Major Components of a "Installation" Transactional Model

- Define high level common business practices
  - Focus on the inventory data
  - Operational processes could be left to the software vendors
- Conduct data mapping to support the needs
  (Based on Legal Requirements first, then Policy)
- Build interfaces for non-transactional data
  (Some sort of Batch Type Processing)

Why Standardize “Installation” Data?

- It reduces the risk that data shared across different organizations and functional areas will be difficult to merge/share because of inconsistent formulations.
- Data standardization is a discipline for developing a unified set of data element specifications, including name, description, format, unit of measure, authoritative source, sensitivity and other characteristics.

Why Normalize a Database?

(Provide a Transactional Model)

- Eliminate data redundancy
- Minimize Operations and Maintenance Cost
- Ensure stable table structures
- Real-time updates to the enterprise

Data Modeling/Integration Issues

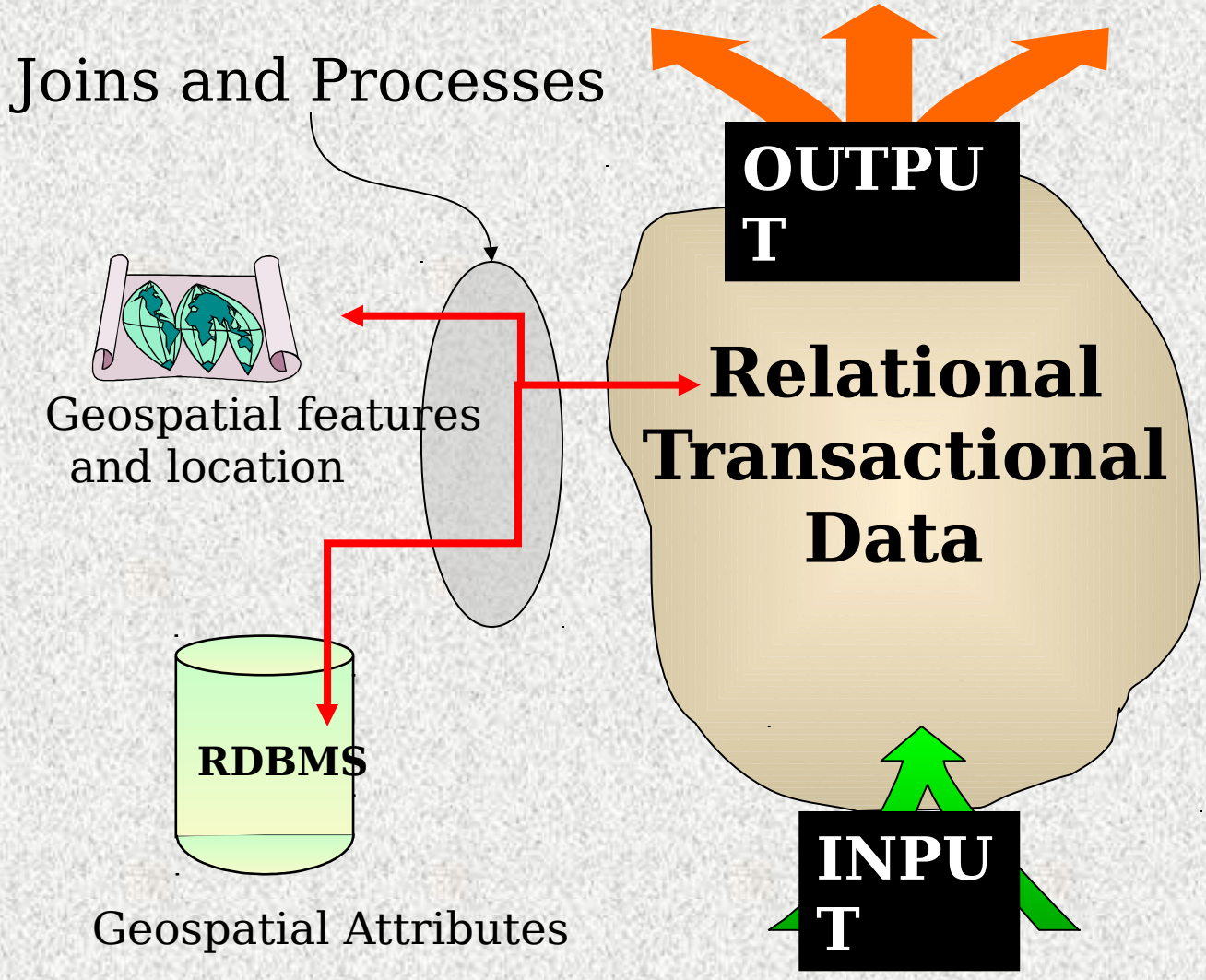
- When Entities and attributes of our business become *tables* and *columns*.
  - Referential Integrity – Integrity maintained by a DBA or a process, assuring that all parent and child tables and their subsequent relationships are intact during and after transactions.
  - How will referential integrity will be maintained between Tri Service Standards and a “Transactional Model”

External vs. Internal GIS Data Structure

(From a Data Maintenance and Integrity Perspective)

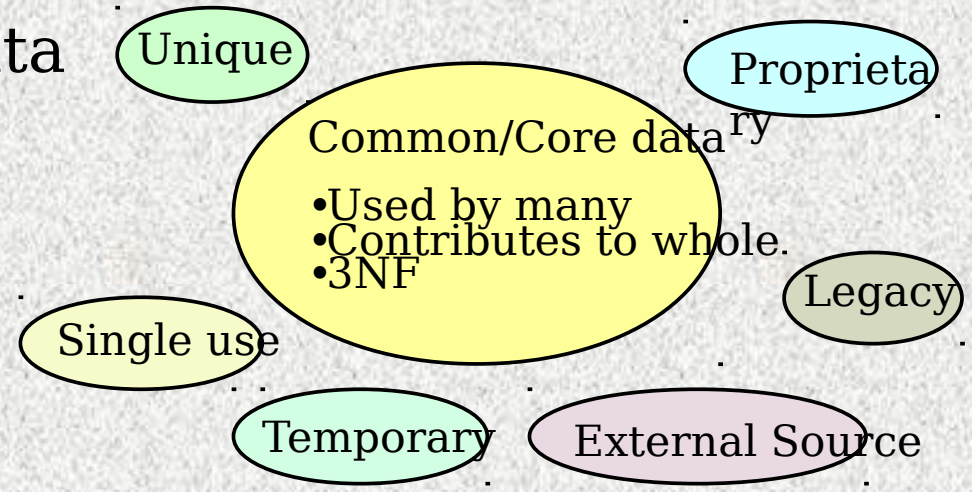
- Most “Assets/Facility” attributes are maintained **outside** of the GIS system.
- Most “Assets/Facility” attributes need to be stored **inside** of the GIS system to be used in analysis.
- A GIS is not the best tool to manage transactional non-graphic data because it is too expensive, limited, and difficult to use.

Inside V.S. Outside



Characteristics of "Enterprise Data"

- Transactional Data Examples
  - Work management
  - Public safety
  - Hazardous materials management
  - Contract execution
- Non-Transactional Data Examples
  - Legacy System data
  - COTS Application data
  - Material safety data



An Approach to Enterprise Wide Information

Case Study: Pax River's Approach to an Enterprise GIS

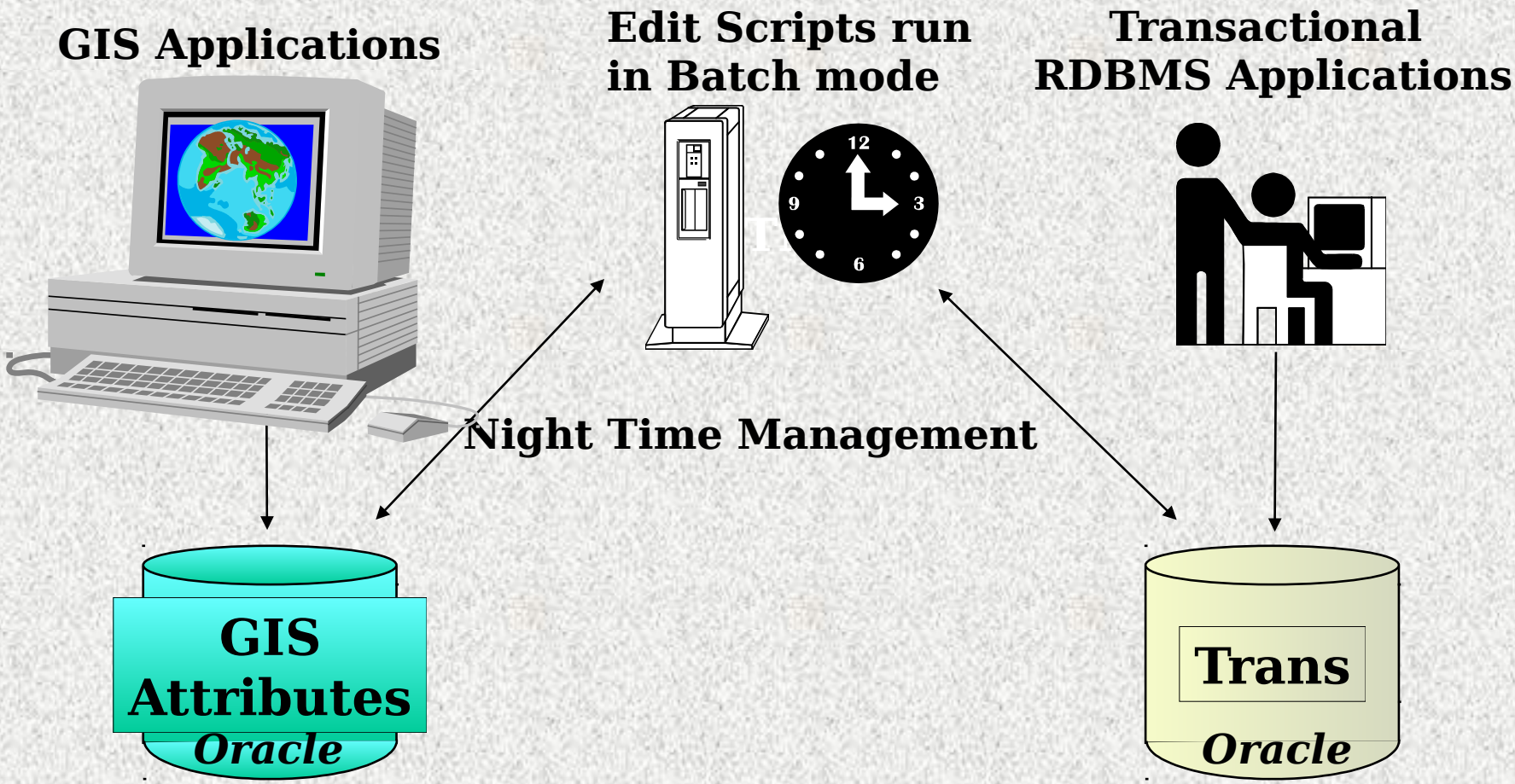
- Most of our "corporate" information, that is, data that we feel is a candidate for incorporation into the TSFMS, used to exist in numerous external databases.
- Our business demands that we share data back and forth between all of our systems.
- It is for this reason that we are moving towards a single relational database as a repository for all transactional data.

PAX Current Architecture

- Many of our systems are at some stage of transition from standalone, or *legacy,* systems to a fully relational system.

- For this reason, we chose to build *applications* that link our GIS to our transactional system.

Our Strategy for Sharing Spatial Attribute Data

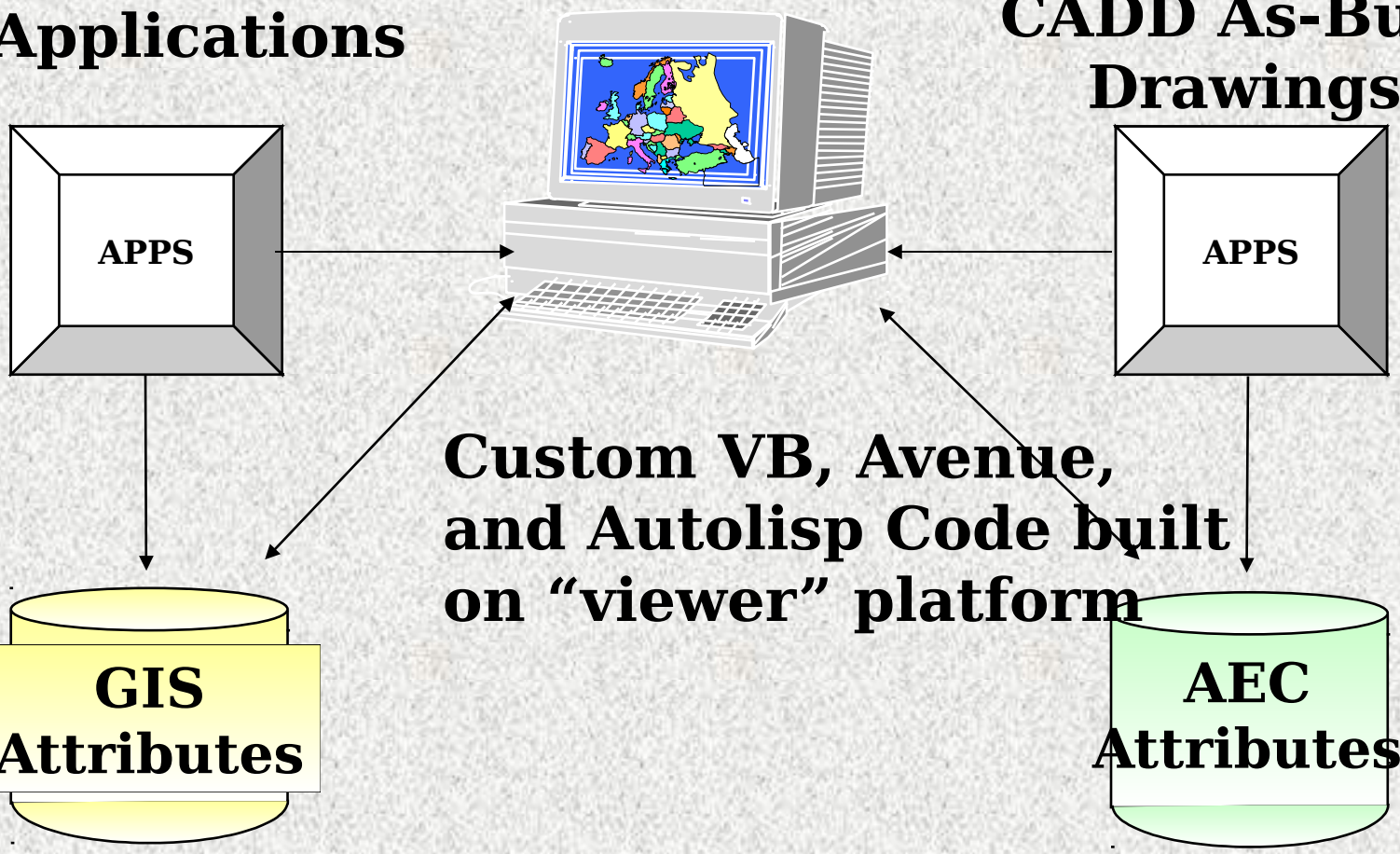


Our Strategy for Sharing Graphic Data

"Universal Spatial Data Viewer"

GIS Applications

CADD As-Built Drawings

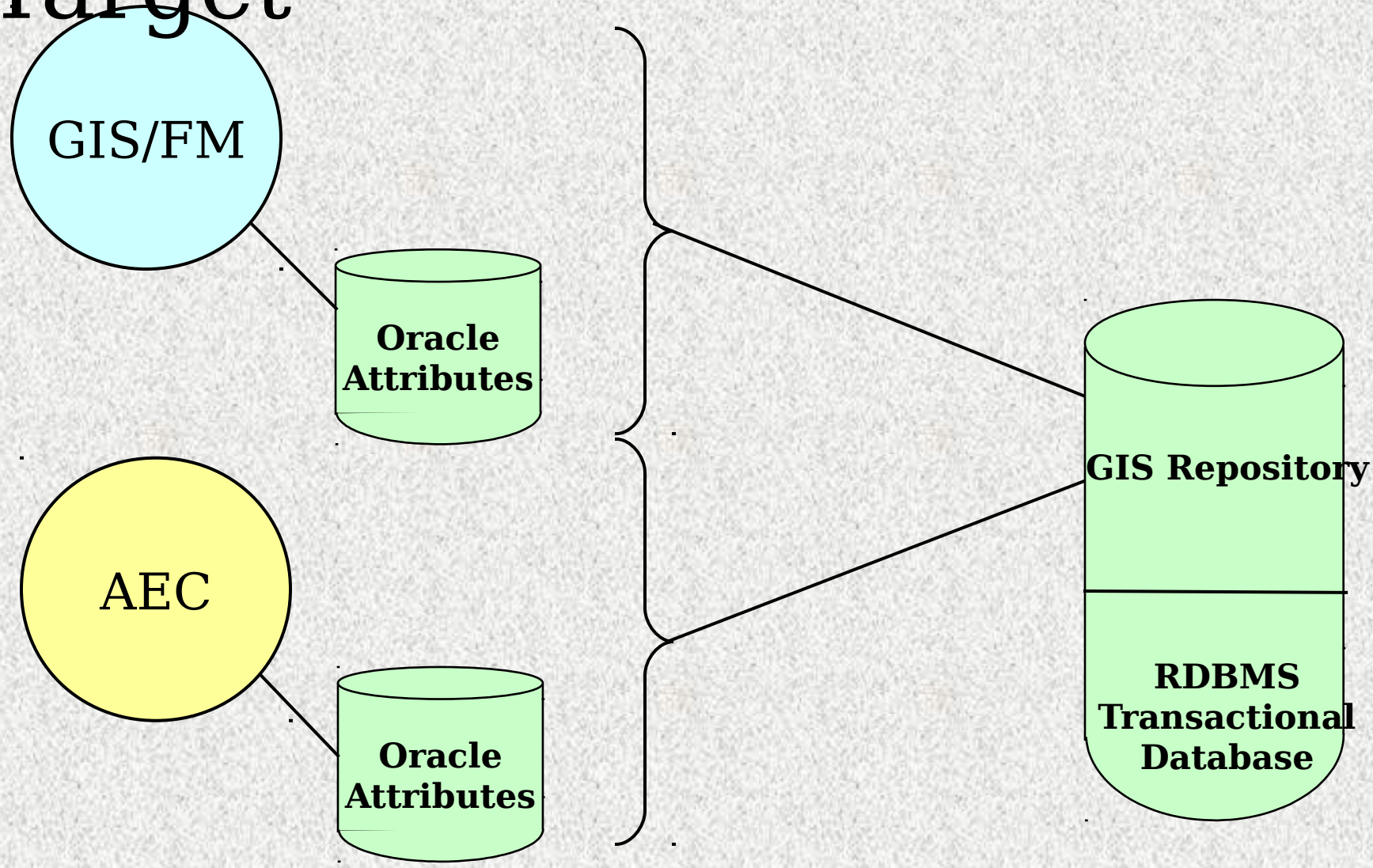


Custom VB, Avenue, and Autolisp Code built on "viewer" platform

PAX Target Architecture

- Eventually, all of our systems requiring corporate data will be integrated and connected to one transactional, relational Oracle database.
- Once our target relational model is built, we will endeavor to bring all of the GIS data into the transactional model.

Phase one: From Legacy to Target

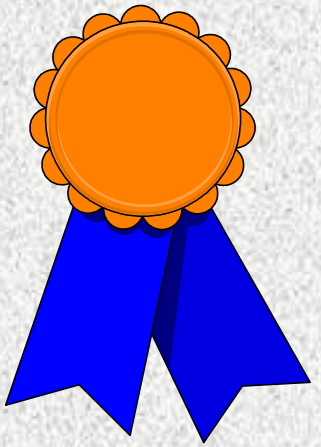


Phase Two: Target Architectu

Any Non-Graphic System

Any Graphic System

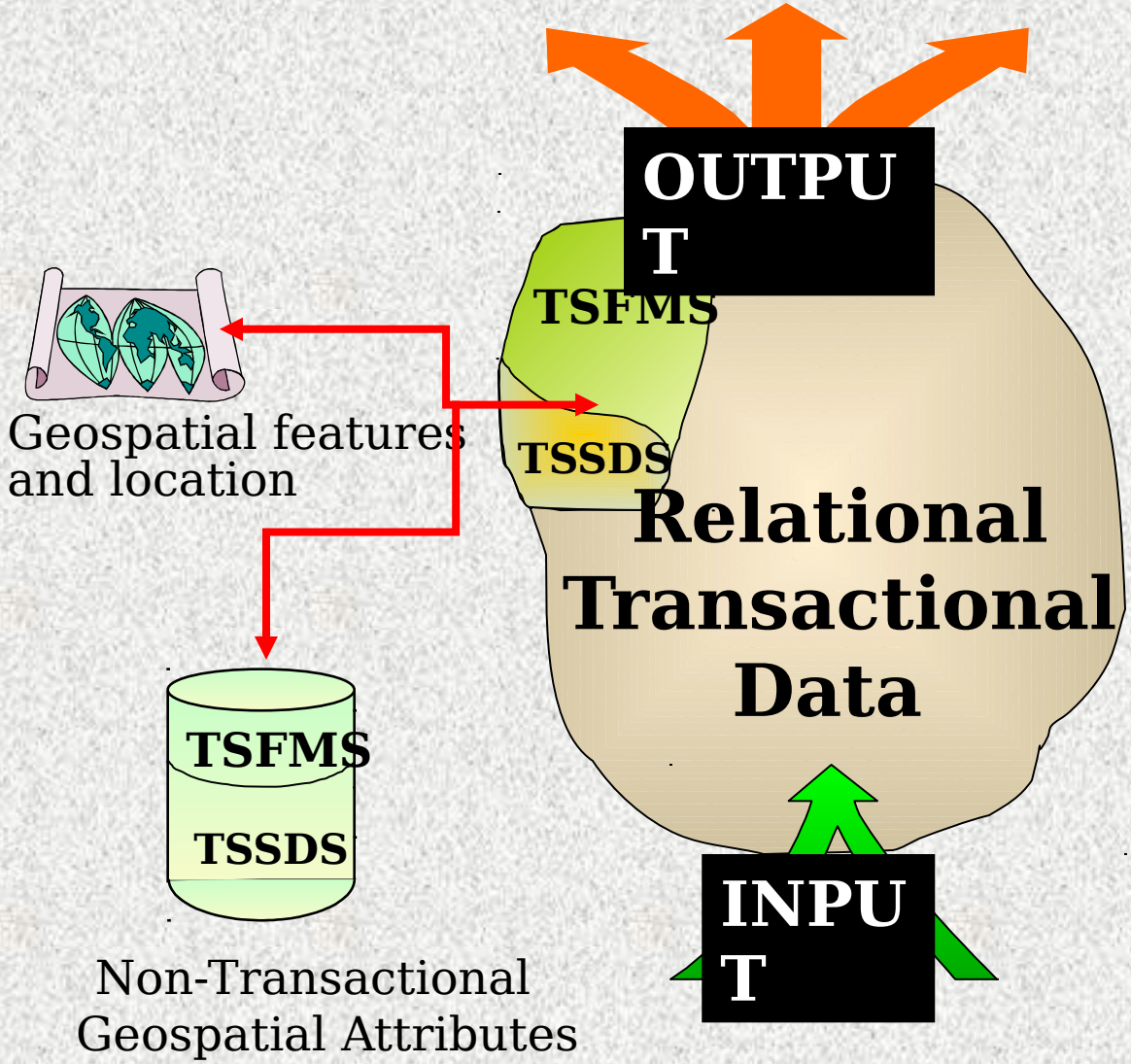
Oracle Attributes 3NF



Can we achieve a Transactional GIS ?

A working example of linking GIS information to a relational transactional database.

How should the Tri-Service Standards fit into Transactional Model?



Where Does Data Come From?

- In “database speak”, who is the parent and who is the child?
- Generally speaking, a GIS provides ***Location*** and ***Measurement*** data values to the Enterprise.
- Transactional Systems provide the temporal (I.e. Fiscal Year) data that is valued by the enterprise.

Calculating and Posting Measurement Values to The Enterprise

- Naval Facility Assets Database (NFADB) requires as many as 3 facility measurement values (Units of Measure)

- TSSDS structure currently contains only 1 Unit of Measure

NFADB Measurement Reporting Requirements

CATEGORY NOMENCLATURE	FACIL CODE	FACIL TYPE	UNITS OF MEASURE AREA	OTHER	ALT
111-10 RUNWAY/FIXED WING	STRC		(SY)	LF	
111-15 RUNWAY/ROTARY WING	STRC		(SY)	LF	
111-20 HELICOPTER LANDING PAD	STRC		(SY)		

TSSDS Measurement Reporting Structure

Entity Set	*Class*	*Table*
Transportation:transportation_airfield:trairsur ta		

FACIL_ID	AREA_SIZE	AREA_U_D	FEAT_LEN	FEAT_WIDTH	DIM_U_D
1595	394700	SFT	2631.33	150	FT
1594	29990	SFT	312.56	150	FT
2454C	798422	SFT	7984.22	100	FT

From GIS to Facilities Management/NFADB:

1. Measurement and other facility attribute data are imported from GIS attribute tables into a temporary Oracle table

2. Category Code and Units of Measure data are imported from Facilities Management tables

From GIS to Facilities Management/NFADB:

3. Multiple measurement values are calculated for each facility (based upon Cat_code)
   - 3 attribute tables of PAX River data (trairsur, traflfet, utwwtpip) require:

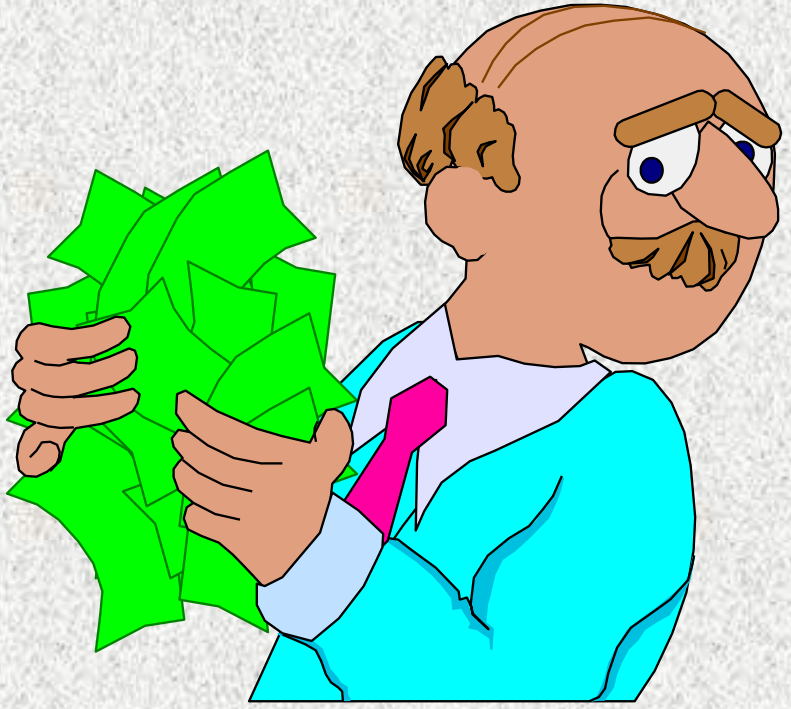
21 measurement combinations
154 lines of code

From GIS to Facilities Management

4. A text file of the calculated values is written for import by the Night Time Management System (NTMS)
5. Quality Control data are written to log files
6. NTMS manipulates the text file and writes to the Facility Management table
7. Log file audit

Let’s Recap

- Why is our target audience moving toward an enterprise solution?



Typical GIS Characteristics
(Pax River View)

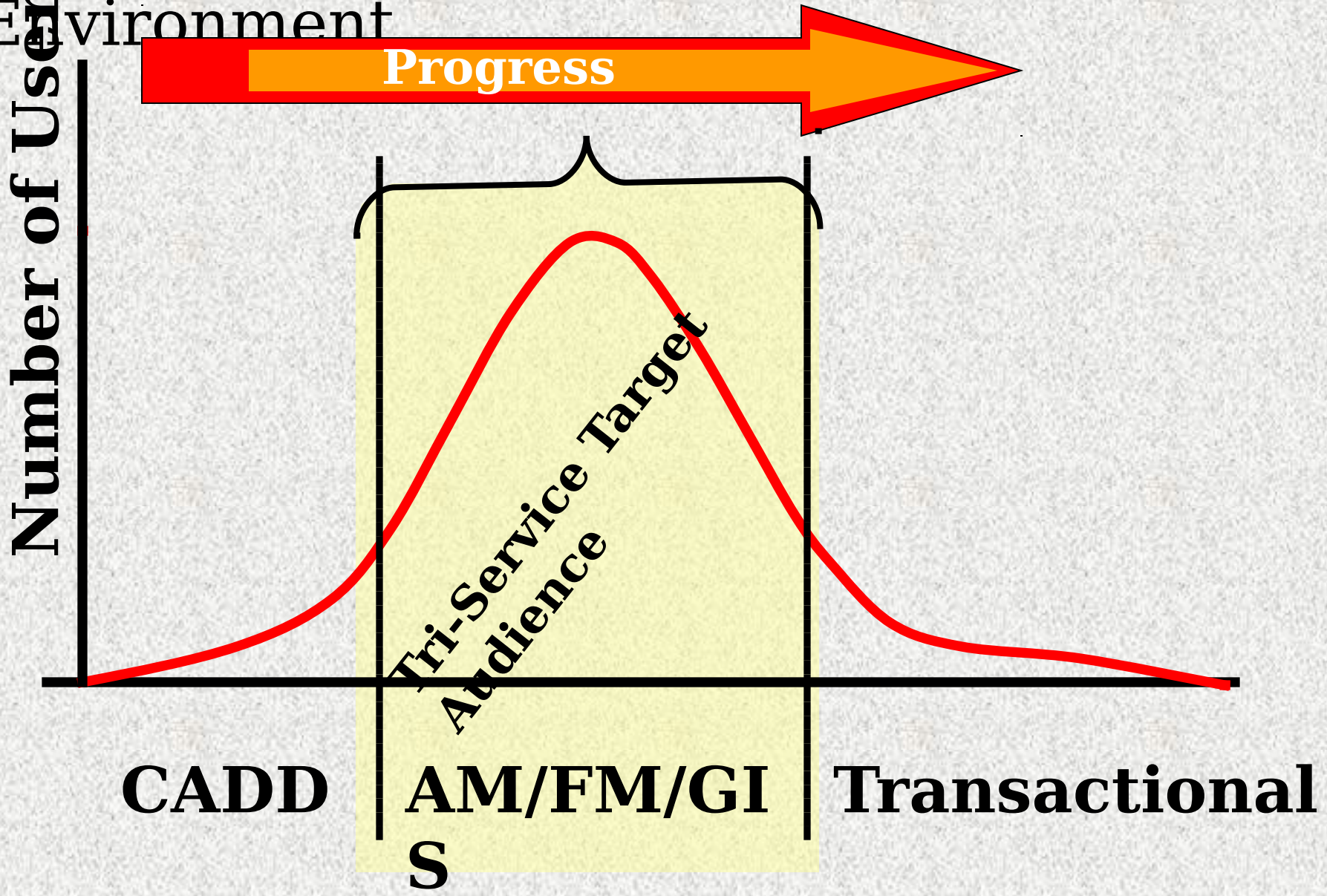
- Too expensive to maintain
- Never up to date
- Unreliable as a decision tool
- Unable to provide Spatial analysis functions to the rest of the Enterprise

Integrated GIS Characteristics (Pax River View)

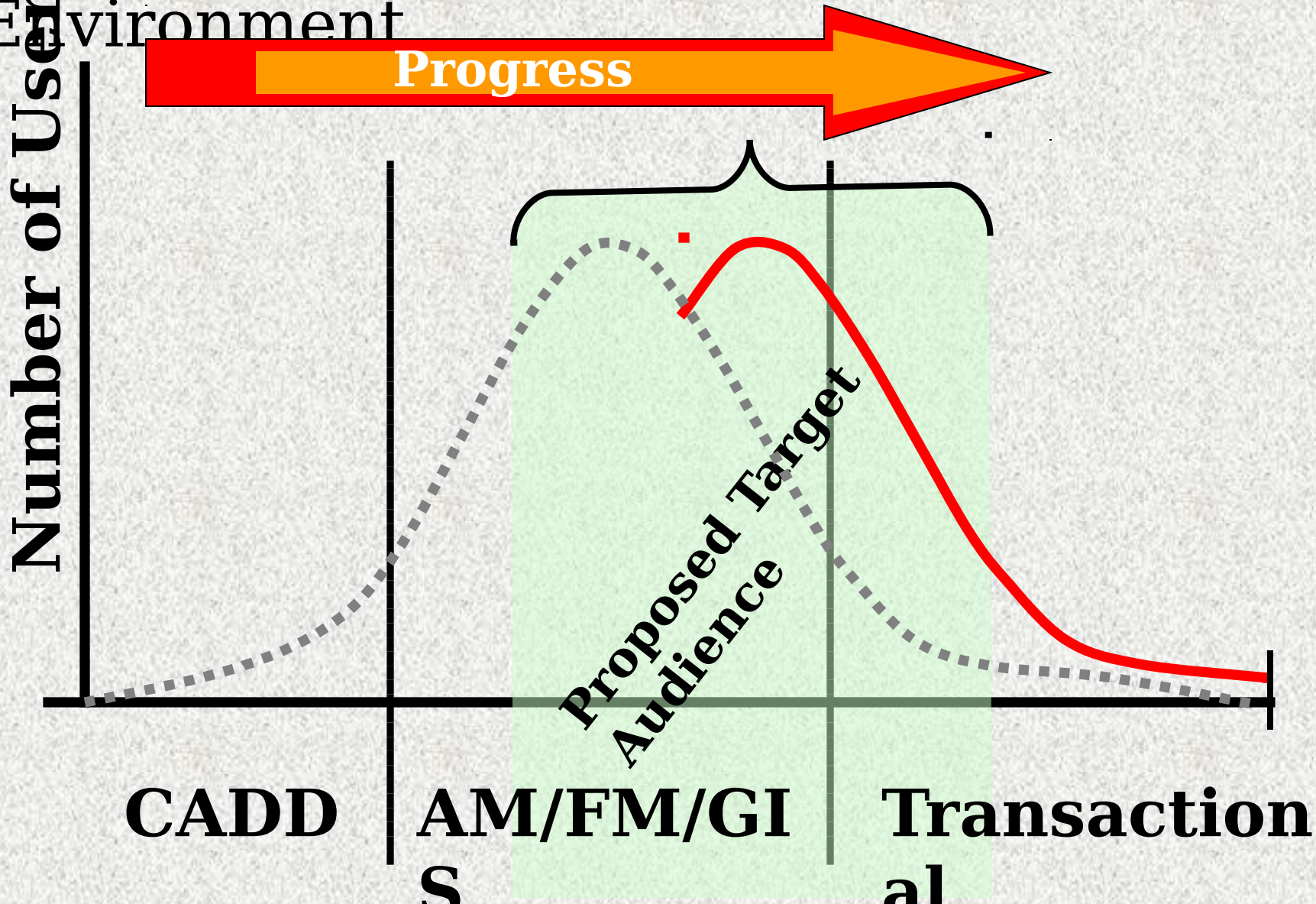
- Attribute updates are automatic
- Data integrity is systematic and quantifiable
- Spatial analysis functions are available to non-GIS applications
- GIS data and analysis aids the decision-maker

Where are we now?
Where do we want to be?

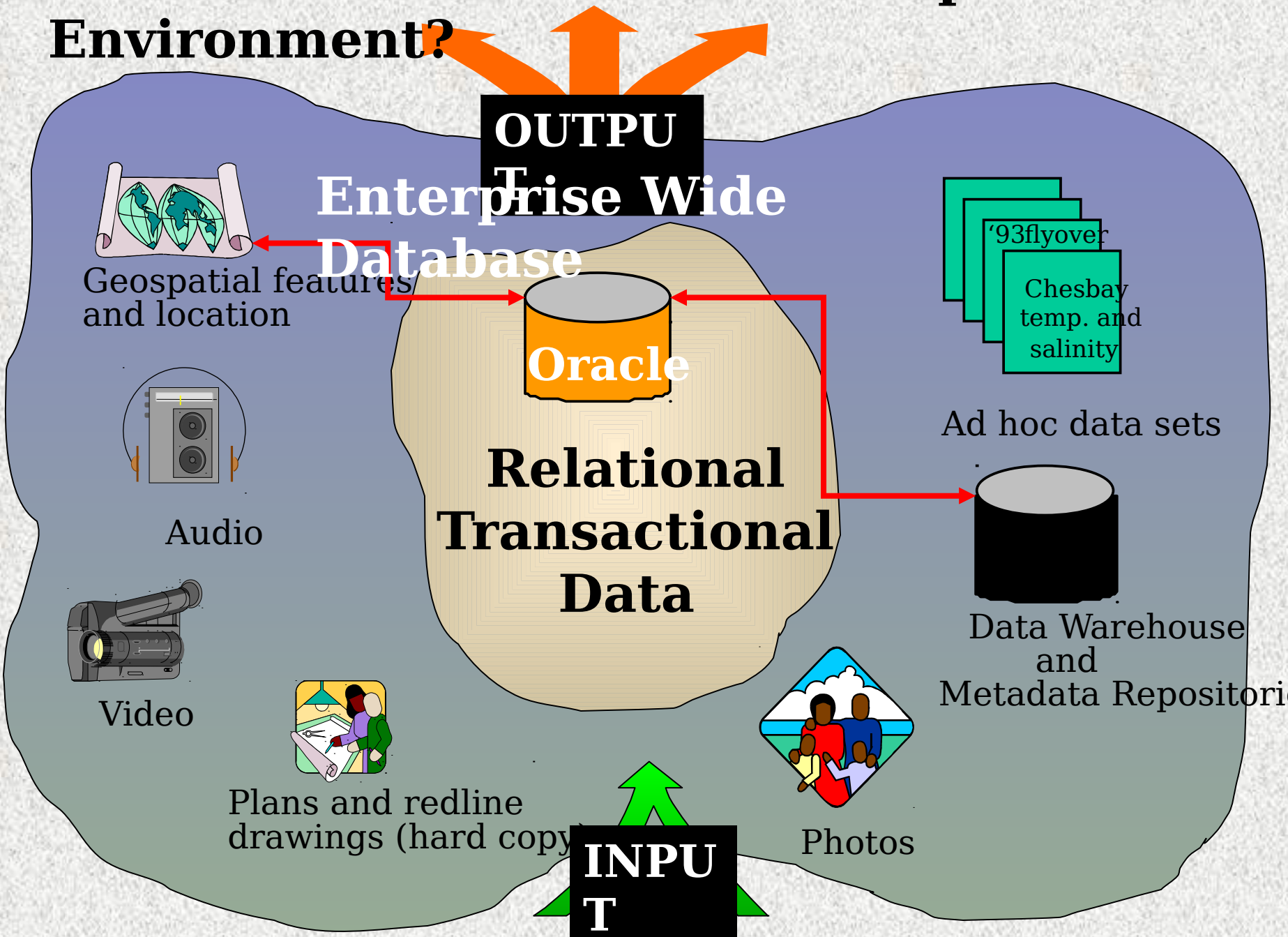
GIS User Population vs. Operating Environment



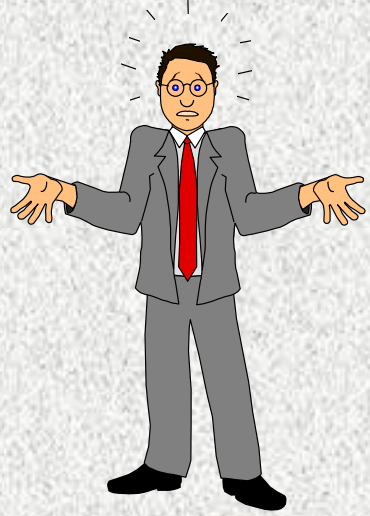
GIS User Population vs. Operating Environment



Where does GIS fit in an Enterprise Environment?



What Next?



- How do we resolve this dilemma?

  Do we:

  - Fix the problem in the Tri-service model and let technology catch up?
  - Let the model serve current technology and write custom applications to bridge the gap between GIS and a transactional data model?
  - Build an interim model with hooks that we can connect to the transactional model?